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THE NATIONAL TOOL AND DIE JOURNAL

TOOLS, DIES, JIGS, FIXTURES, MOULDS, GAGES, MACHINES
Design and Engineering
PRECISION SPECIALTIES
STAMPING and PARTS PRODUCTION
Official Publication
Special Tool, Die & Machine Shop Industry

DECEMBER
1939

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The National Tool and Die Journal

—

Editor
George J. Huebner
Assistant Editor
Paul L. Reed

—

Official Organ of the Special Tool, Die and Machine Shop Institute

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CONTENTS

A Survey of Plastics Materials for the Mold Maker
Part one of a two part survey—Paul L. Reed 11
Making an Ally of Time—D. V. Stevens 14
Die Designing and Estimating (XII)—George Dannes 15
Norton Announces New No. 2 Cutter and Tool Grinder 22
Milling Attachment With Unusual Range of Capacity 25
Catalog Review 26
Buy with Confidence Directory 30
Contract Shops 36, 37

Advertisers In This Issue

Acme Industrial Company 32
Ajax Steel & Forge Co. 31
Armstrong-Blum Mfg. Co. ..... Back Cover
Barth Stamping & Machine Works 36
Bates, H. O. 38
Bissett Steel Company 38
Boyar-Schultz Corp. 25
Bunell Machine & Tool Company ..... 6 and 36
Carborundum Company 5
Cleveland Universal Jig Company 37
Columbia Tool Steel Co. 33
Danly Machine Specialties, Inc. 9
Davis Tool & Engineering Company 36
Denning Manufacturing Company 37
Detroit Alloy Steel Co. 8
Detroit Stamping Company 23
Drive-All Manufacturing Co. 24
Enterprise Machine Parts Corp. ..... 7 and 36
Ex-Cell-O Corp. 19
Federal Tool Corp. ..... 22 and 36
Forging and Casting Corporation ..... Center Spread
Gallmeyer & Livingston Co. 29
Gear Specialties, Inc. 27
Geo. Gorton Machine Co. 29
Gerstner Tool Chests 34
Hahn Manufacturing Company 36
Hamilton Tool Company ..... 35 and 37
Hanna Engineering Works 3
Hartford Special Machinery Co., The 35
Hovis Screwlock Company 30
Industrial Machine Company 37
Kearney & Treckler Corp. 10
Kiffer Tool & Die Co. 37
Koestlin Tool & Die Corp. ..... Inside Front Cover and 36
Lincoln Tool & Die Co. 36
Majestic Tool & Mfg. Co. 36
McKinney Tool & Manufacturing Co. 37
Modern Tool & Die Company 37
New Method Steel Stamps, Inc. 34
Northeastern Engineering Company 36
Ohio Tool Company 37
Onsrud Machine Works, Inc. 34
Paramount Tool Company 37
Phoenix Machine Company 37
Porter, Geo. H., Steel Treating Company 33
Putnam Tool Co. ..... Front Cover
Robbins Engineering Co. 36
Royal Oak Tool & Machine Company 36
Sal-Way Steel Treating, Inc. 28
Schraner, A. P., & Company 37
Sommer & Adams Co. ..... Inside Back Cover and 37
Star Machine & Tool Company 37
Star Tool & Die Works 36
Tools & Gages, Inc. 37
Ulmer, J. C., Company 37
Variety Machine & Stamping Company 37
Walton Company 33
Wheelock Lovejoy & Co., Inc. 28
Wittek Manufacturing Co. 38
Wm. S. Yohe Supply Co. 34

TDM PROGRESS circulation affords the only complete primary coverage of the tool rooms, die and mold shops in the production industries and the contract builders of special tools, dies, machines and precision specialties.

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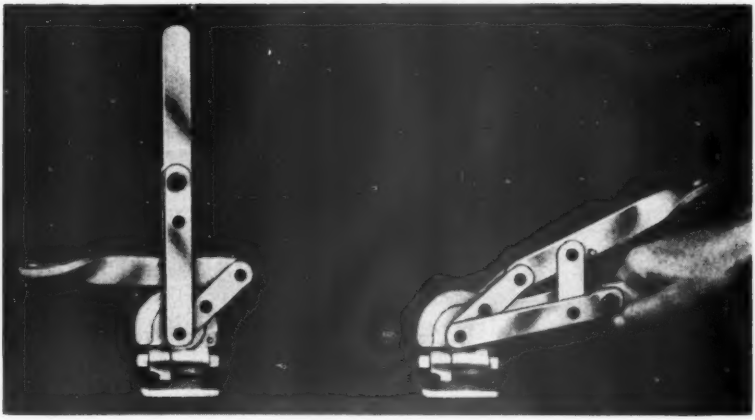

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Tool • Die • Machine **PROGRESS**

The National Tool and Die Journal

December, 1939 **Vol. 5, No. 9**

A **Reader Requested** Article

A Survey of Plastics Materials for the Mold Maker

Part One of a Two Part Survey

By Paul L. Reed
Assistant Editor

SINCE plastics are products of the synthetic chemical industry the number of combinations of molding preparations is practically endless. Fortunately, however, the commonly used mold mixtures fall into natural, easily understood groupings. As we are primarily concerned with the interest of tool room and die shop men, we will make a grouping of plastics materials from the molder's standpoint.

The groupings fall into the following general classes:

1. Phenolic Base Molded Compounds ***(Phenol-Formaldehyde)***

Phenol (carbolic acid) and formalin (a solution of formaldehyde made by the partial oxidation of heated wood alcohol and air passed over heated copper or platinum) are blended to form a resin which is combined with fillers such as woodflour, asbestos, fabric or graphite. This is by far the largest class of compounds; it permits the lowest price molds to be used and utilizes a greater variety of sizes within the practical range of mold design. Strength is considered first and appearance second, although a number of these plastics are very attractive. This class offers a wide variety of compounds ranging from the standard all-purpose woodflour base to canvas fillers used for strength, asbestos fillers for heat resistance and mica fillers for dielectric properties and is capable of being molded to almost any shape.

Fillers used in addition to woodflour or cellulose include minerals of which the most important is asbestos, and fabrics of which cotton is the more commonly used. One of the leading manufacturers uses phenolic molding plastics for radio tube bases, switch plates, telephone receiver sets, pencil barrels and a great variety of similar uses. The same compound using a mineral filler is widely used for making molded commutators, outdoor insulation, handles for cooking utensils, ash trays and similar objects. Products made by other leading manufacturers using this same general type of molding compound include radio cabinets, washing machine parts, cosmetic containers, large and small automobile trim and electrical appliance parts, buttons, clock enclosures and specialties of all sorts.

One producer of precision molded parts has developed a plastic thread-advancing reel for a rayon manufacturer. In fact, in this same plant, the rayon filament, except during drying and twisting, comes in contact with plastic parts only until the rayon yarn is delivered to the coning room.

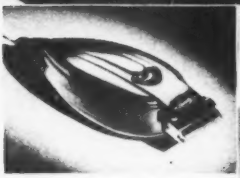
Phenolic base molded compounds are

Left—A Phenol (Textolite) record holder, difficult to mold because of its size and the intricacy of the 39 curved record spacers $\frac{1}{16}$" apart and the danger of warpage. The spacer grooves had to be machined out of solid blocks to eliminate parting lines.

Photo courtesy General Electric Company

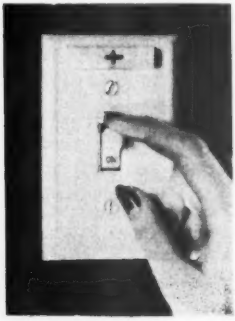
Below—A sewing box with circular insert for needles and thread is available in ten colors of Resinox. Molded by Mack Molding Company.

Photo courtesy Monsanto Chemical Company



This Textolite housing and cover for a dry shaver involved undercuts and metal inserts molded-in at an angle.

thermosetting—i.e.—they acquire infusibility under heat and pressure. After removal from the mold, phenolic molded products are practically unaffected by high temperatures, and cannot be remolded. The laminated and cast phenolics are also thermosetting. Plastics materials that can be remolded subsequently by being subjected to the same conditions of heat and pressure are called *thermoplastic.*



An ivory urea Safety Switch Plate with minute light in aperture, molded by Tecklite Mfg. Company.

Photo courtesy Bakelite Corporation

2. Urea Base Molded Compounds ***(Urea-Formaldehyde)***

The urea molding compounds fill a need for light colored plastics, including white, ivory and a variety of pastel shades. The urea group is compounded from urea formaldehyde-resin, filler, pigments, and plasticizing agents. Although an unlimited range of colors is available in urea, the lighter shades are most frequently used. The largest manufacturer of urea specializes in such equipment as reflector bowls and quite a wide variety of electrical switch parts for interior home and business use. However, many small objects such as buttons and slides, radio cabinets, electric shaver cases and stove and cabinet hardware are manufactured.

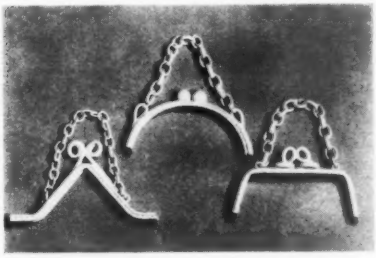
Both the phenolic and urea compounds are made on the same kinds of presses and at about the same range of temperatures. However, urea compounds use positive molds so that not all phenolic molds are interchangeable. Urea compounds are thermosetting.

3. Cellulose Acetates—Molded

The cellulose acetates are made by treating specially purified cotton linters. Cellulose acetate molding compound is cellulose acetate with pigments, dyes and a suitable plasticizer. The acetates are thermoplastic; they change their form under the application of heat and pressure without any chemical change. In most cases it is necessary to cool cellulose acetate molds about 100 degrees F below the molding temperature before removing the molded part. This involves the use of specially designed molds to carry steam or water lines for such heating and cooling.

The advantages of cellulose acetates are toughness, resilience and high polish. Because of its toughness cellulose acetate can be used in thin wall sections where many other compounds would not be suitable.

Cellulose acetate plastics can be made either by compression or injection molding. The good electrical properties of



Above—Handbag frames of cellulose acetate molded by Gold Seal and Rex Products.

Right—Ivory and ebony gavels made by Shoreham Mfg. Co.

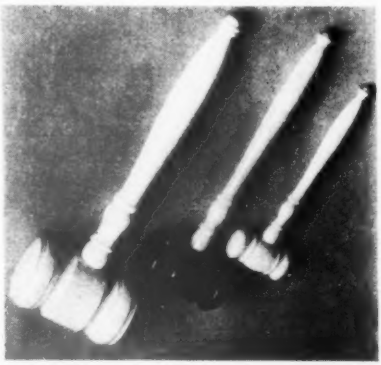
Photos courtesy Monsanto Chemical Company.

cellulose acetate molding compounds are widely utilized in the electrical industry. However, being thermoplastic, their electrical properties will break down when subjected to heat for any length of time. One of the principal advantages of these compounds is the truly wonderful range of colors which can be obtained. They can be made transparent, translucent or opaque. Also, they can be made in imitation of products of nature, such as wood grains, tortoise shell or structural stone markings. Some of the principal products made from this plastic are steering wheels, instrument panels, radio dials and panels, electrical appliance parts and lighting accessories. A wide range of toilet and novelty articles are also manufactured.

A new acetate introduced in December 1938, cellulose acetate butyrate, which is especially suitable for injection molding has made some headway. This plastic has shown superior qualities for resisting effects of the weather (heat and humidity) and is used for molding such products as automobile tail light lenses, automotive emblems, direction indicators, interior refrigerator parts and such articles as combs, brush handles, hand fish reel ends and other articles which either require frequent cleaning or which are wet for considerable periods of time.

Another member of this group—cellulose nitrate—is the oldest member of the chemical plastics family and still holds its place because of its toughness, water resistance and brilliant clarity which permits infinite color variations. An early difficulty tending toward inflammability has been overcome. As would be expected, a considerable variety of articles are made from cellulose nitrate compounds including such articles as bag frames, brushes, buckles, drafting instruments, fountain pens, golf club parts, trim for toilet articles, piano keys, razor handles, tool handles and spectacle frames. Cellulose nitrates are "stamping" or compression molded as they do not lend themselves to injection molding.

Part 2 will appear in an early issue.



THE necessity for keeping costs down has always been kept in mind by machine tool designers. To the increased speeds of modern machines have been added greater accuracy and wider capabilities. Dies and molds have always been very costly, one reason being the long periods required for their building. Reducing "dead" time, usually setup and transfer time, is a very important factor in reducing the cost of finished dies or molds. Obviously, the more operations that can be done without changing setups, the greater is the production rate and the lower the piece part cost.

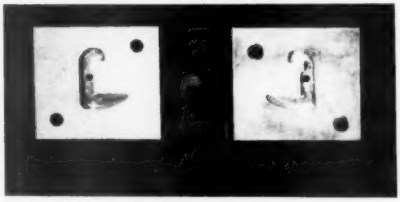
Making an Ally of Time

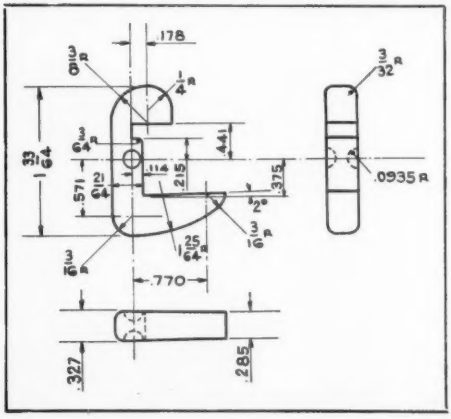
The Rotary Head Tool and Die Milling machine recently announced by Kearney & Trecker Corporation (see page 18, September) is one of the most effective answers for turning out dies and molds faster and more economically. The part drawing is that of a Tenite Clip. The building of the mold for this clip, shown below, illustrates the advantages, particularly the time saving advantage, of the use of the Rotary Head Tool and Die Milling Machine.

The clip was made for a California manufacturer who is using it to hold a mirror to the backboard of furniture. Tenite (the Eastman cellulose acetate) was selected because of its decorative appearance.

The time breakdown for producing the single cavity mold illustrates one capabil-

(Continued on page 19)





Left — The Tenite Clip part drawing.

Above left — The single cavity mold set up for machining. By moving the machine jib borer fashion the 12 cavity mold was made with the same setup.

Above—The finished mold with a molded sample.

Die Designing and Estimating

Advanced Series

XII

By GEORGE DANNES

George Dannes is superintendent and engineer of the Permoflux Corporation of Chicago, and instructor in the advanced class studying Die Designing and Estimating at the Carl Schurz High School under the auspices of the Chicago District of the Special Tool, Die and Machine Shop Institute.

This is the last of the series of Mr. Dannes' articles. The series has created so much interest that we will publish the articles in book form (see announcement, page 35).

The shop men, apprentices and students who have followed this series will be glad to know, as we are proud to announce, that Mr. Dannes and Mr. Bohmer, who wrote the series of articles on die designing published in every issue of PROGRESS in 1938, will collaborate on a new series for 1940. The new series will be even more interesting and instructive—it will include modern die designing practice and further amplification of the original estimating methods introduced this year.

—*The Editor.*

THE METHOD APPLIED TO A THREE STATION PROGRESSIVE DIE

SPECIFICATIONS for the die to produce the part illustrated in Fig. 36 call for the manufacture of 500,000 pieces. The material specified is .020" soft cold rolled steel (CRS). Sufficient time and study were devoted to laying out the die on the board to assure a design which would produce the piece with the fewest number of operations and minimum down-time of the press.

The die as it was finally developed is illustrated in Fig. 37. It is the progressive type and finishes the piece part completely. Fig. 38 illustrates the consecutive stages through which the strip stock passes. It will be noted from the part drawing, Fig. 36, that the tolerances are commercial with the exception of the one dimension .593" for which ± .002" is specified.

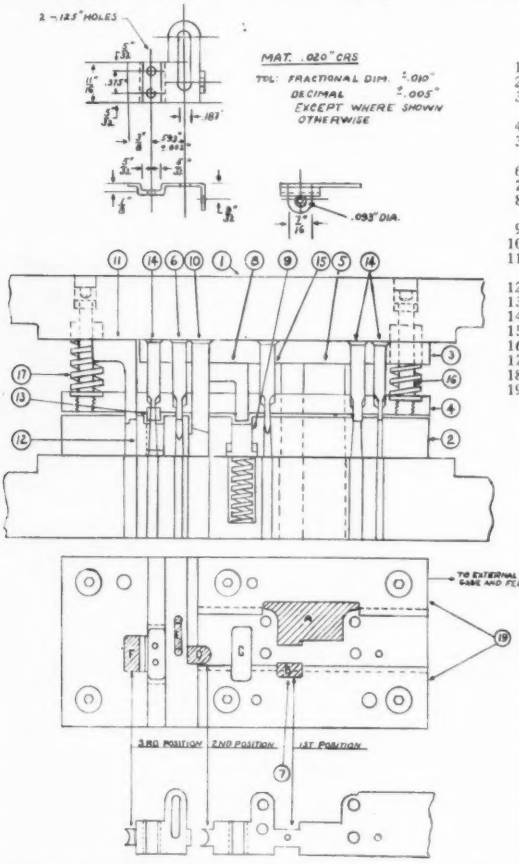
The designer must realize that he is likely to run into considerable difficulty because of this particular dimension unless necessary precautions are taken. It would never do to pierce the holes first and then expect that the part will come within specified tolerances in the forming process. Why? Because there are two bends between the holes and the variable factors introduced could never be controlled to assure a perfect alignment of the critical dimension continuously.

By variable factors are meant conditions experienced daily by every die maker such as varying hardnesses of steel and springiness of stock which introduce variations in spring-back; varying stock-thicknesses which if oversize permit "stretching" of the material and

elongation of the part itself; or if undersize, prevent the bends from "coming square".

Notwithstanding all of these variable factors, the critical dimension can be held to specified tolerance successfully by *forming* the part before *piercing* it. We are certain then that the two holes and the slot will always be located accurately and that only the shifting of punches or pilots can disturb the accuracy of the critical dimension.

With this die an automatic stock feed is used thus eliminating all necessity for stops. At the beginning of the run the stock is placed slightly over the edge of the front notch die opening, No. 7, which is indicated (Fig. 38) as first position. Then, by tripping the press manually we notch away the greater portion of the outline, No. 5, pierce the two holes which later are made into the slot and also the .093" diameter hole located in the portion which will later become the lug. The



LIST OF MATERIAL

1—4" x 10" DIE SET
2—DIE BLOCK 1" x 4" x 9" OHTS
3—PUNCH PLATE ½" x 4" x 7" CRS
4—STRIPPER ½" x 4" x 9" CRS
5—NOTCH PUNCH 1¼" x 1½" x 2½" OHTS
6—SLOT PUNCH B & S
7—NOTCH PUNCH OHTS
8—FORM PUNCH 1" x 1¼" x 1¼" OHTS
9—FORM PAD OHTS
10—SHEAR FORM PUNCH OHTS
11—TRIMMING PUNCH 1" x 1½" x 2" OHTS
12—DIE INSERT OHTS
13—STRIPPER INSERT
14—PERFORATORS, DRILL ROD
15—PILOTS, DRILL ROD
16—STRIPPER BOLTS
17—STRIPPER SPRINGS
18—PAD ACTUATING SPRING
19—STOCK GAGES ¼" x 1¼" x 6" each
MISC. SCREWS & DOWELS

Fig. 36, Top Left, Piece Part.
Fig. 37, Center, Die Elevation and Plan.

Fig. 38, Bottom, View of Strip of Material in its Successive Stages.

feed on the upstroke of the ram will advance the stock to the second position. Again operating the press manually we cut away the end of the strip to give it the half-moon effect shown in Fig. 38. The punch performing this operation is a shear form punch, No. 10, and is longer than the others, the reason for which will be clearly understood on the next downward stroke of the press.

On this second stroke we notch away also the rest of the blank outline, piloting with two pilots and form the ⅛" deep step. All the material necessary to form this step is drawn from the left hand side and away from the shear form punch. Trouble was experienced with this particular action because in the forming process the material had the tendency to draw or flow from both sides, causing the blank to distort. A piece of

hardened steel conforming to the outline of the blank was inserted in the stripper to prevent the blank from moving.

The stripper, No. 4, is a spring stripper and the forming is done under pressure. There is a forming pad, No. 9, actuated by two springs, No. 18. The forming punch, No. 8, causes the pad to strike "home" or bottom which in turn squares the bends.

The strip appears now as shown in second position, Fig. 38. Again on the upward stroke of the ram the stock has advanced to position 3 and it is here the piece part is completed in the following manner: The strip stock being held under pressure by the stripper is first cut or separated by shear form punch, No. 10, which then performs double duty by, (1) Cutting off the blank to permit the stock to flow freely for the forming operation in the second position, (2) Forming the lug in the third position. The blank is now free but under pressure. It is held in location by two pilots which are part of slotting punch, No. 6. Trimming punch, No. 11, now trims off the half-moon shaped tail, bringing the flange to size, while slotting punch, No. 6, pierces the slot and perforators, No. 14, pierce the two holes shown in third position, Fig. 38. On the upward stroke of the press a jet of air "blows" the completed part out of the die while the stock again advances.

Important items of die construction to be noted are: Die block, No. 2—made of oil hardening tool steel—has all perforator and pilot holes and six die openings, A, B, C, D, E, F in plan view. A and B are notchings, C receives and holds the forming pad, No. 9, D is the shear form punch opening. A slot milled ⅝" deep allows

(Continued on next page)

DIE WORK ESTIMATING SHEET

	A	B	C	D	E	F
DIE BLOCK No. 1	1.0 1.2	1.2				3.0
DIE A			1.4	11.0 1.1		
DIE B			.4	4.0 .4		
DIE C			.4	4.0 .4		
DIE D			.4	4.0 .4		
DIE E			.4	4.0 .4		
DIE F			.7	6.0 .6		
PUNCH No. 5	.4 .6	.5		7.7		1.0
PUNCH No. 7				2.8		1.0
PUNCH No. 8	.3 .5	.4		4.8		1.0
PUNCH No. 10				2.0		1.0
PUNCH No. 6				2.8		1.0
PUNCH No. 11	.3 .5	.4		4.8		1.0
PAD No. 9				4.0		1.0
INSERT No. 13		.3		2.0		1.0
INSERT No. 12				6.0		1.0
PUNCH PLATE No. 3	.5 .4	2.0		1.2 .8 1.2		3.0
STRIPPER No. 4	.6 .4	1.1		2.2 .8 .8 .8 .8 .8		
PERFORATOR No. 14			1.0		2.7 4.5	2.5
PILOTS No. 15			.4		1.0 1.8	1.0
STRIPPER BOLTS No. 16					1.6	
SPRINGS No. 17-18		3.2 1.0				
GAGES No. 19		1.0		1.2 .6 .6 .6		
INSPECTION			6.7			
TRYOUT						6.0
DIE SHOE		.9		3.3 1.2 1.2 1.2 .2		
HOLDER		1.8				
DEVELOPMENT						3.0 8.0
	6.7	13.8	11.8	92.7	11.6	35.5

Total 172.1 hours

Fig. 39

the finished part to be "blown" out without meeting with obstacles. E is the slotting punch opening and F is the opening which receives insert, No. 12, and also serves as a clearance hole for the trimmings to fall through. A slot, slightly wider than the maximum width of the formed channel of the piece part is milled across the die on this opening to eliminate the possibility of obstruction when the piece is being ejected.

Punch plate, No. 3—made of cold rolled steel—has mounted in it all perforators and pilots, notching punch, No. 7, shear form punch, No. 10, slotting punch, No. 6. Note notching punch, No. 5, and forming punch, No. 8, are mounted on the punch plate to insure less difficulty in "lining up" all parts.

Stripper, No. 4—made of cold rolled steel—spring type, actuated by eight springs, No. 17, eight stripper bolts, No. 16, fasten it to the punch holder. Insert, No. 13, made slightly longer than width of formed portion of piece part, prevents its buckling or distorting while being pierced.

Notching punch, No. 5—made of oil hardening tool steel—type 1 construction, is mounted on punch plate with two screws and two dowels. Trimming punch, No. 11—made of oil hardening tool steel—is mounted directly on punch holder with one screw and two dowels. NOTE: Die insert, No. 12, must be provided with a narrow undercut as shown on die layout to allow for grinding and maintaining a sharp corner.

We proceed now to estimate the hours of labor required to build the die. Use the standard Die Work Estimating Sheet as shown in Fig. 39.

MACHINING AND GRINDING

Column A—for time values see Table, Fig. 6.

	Machining hr.	Grinding hr.
DIE BLOCK No. 1—dimensions 1" x 4" x 9"	1.0	1.2
PUNCH No. 5—1¼" x 1½" x 2½"—use Table value 1" x 2" x 2"	.4	.6
Punches 7, 10 and 6 omitted because of small sizes.		
PUNCH No. 8—1" x 1¼" x 1½"—use 1" x 1" x 2"	.3	.5
PUNCH No. 11—1" x 1½" x 2"—use 1" x 1" x 2"	.3	.5
PUNCH PLATE No. 3—½" x 4" x 7"—use 70% of OHTS values because made of CRS—only one set-up necessary..	.5	.4
STRIPPER No. 4—½" x 4" x 9" CRS (70%)	.6	.4

TOTAL Column A ..... 6.7 hrs.

DRILLING OR BORING SCREW AND DOWEL PIN HOLES AND ALL OTHERS EXCEPT FOR PERFORATORS AND PILOTS.

Column B—for time values see Table, Fig. 7.

DIE BLOCK No. 1—6 screws, 5 dowels .....1.2 hrs.
PUNCH No. 5—2 screws, 2 dowels .5
PUNCH No. 8—1 screw, 2 dowels .4
PUNCH No. 11—1 screw, 2 dowels 4
INSERT No. 13— 3
PUNCH PLATE No. 3 — 4 screws, 2 dowels for mounting, 7 holes for mounting punches No. 5 and No. 8, 6 clearance holes for stripper bolts—total 19 holes 2.0
STRIPPER No. 4—8 holes for stripper bolts, 2 holes for mounting insert No. 13—total 10 holes 1.1
STRIPPER SPRINGS No. 17—See Fig. 8—8 holes 3.2
FORM PAD SPRINGS No. 9—2 holes 1.0
STOCK GAGES No. 19—2 screws each—total 4 .....1.0
DIE SHOE—6 screws, 2 dowels. .9
PUNCH HOLDER — mounting punch plate—6 holes, trimming punch No. 11 — 3 holes, for stripper bolts—8 holes, total 17 holes 1.8

TOTAL Column B .....13.8 hrs.

LAYOUT AND INSPECTION

Column C—for contour and time values see Tables, Figs. 9, 10, 11, 12.

Layout

DIE OPENING A—14 units ....1.4 hrs.
DIE OPENING B—4 " 4
DIE OPENING C—4 " 4
DIE OPENING D—4 " 4
DIE OPENING E—4 " 4
DIE OPENING F—7 " 7

Explanation: Die openings D and E actually have only 3 and 2

(Continued on Page 27)

Making An Ally of Time

(Continued from page 14)

ity of the new Kearney & Trecker Mill:

Setup and layout	1 hour
Drill and bore dowel holes..	¾ "
Mill impressions and bore 2 core holes	6 "
Scrape and file	1 "
Polish	½ "
Total	9¼ hours

In actual production, however, a 12 cavity mold was used. Since one cavity was completed in 9¼ hours, it is safe to estimate that 12 cavities could be finished in 80 hours since it would be only be necessary to move the machine table jigborer fashion from one cavity to the next to perform the same operation consecutively on all the cavities.

At present when it is so difficult to get trained operators, the dependence on the machine is in inverse ratio to the skill of the operator. It is desirable that the operator be experienced in the art of removing metal by milling so that he knows how to properly condition his cutter so that it will mill accurately and give the proper finish. Since all screws governing the various movements of the machine table, Rotary Head and Rotary Head slide are hardend and ground, most jobs can be milled according to the graduations on the machine. Very little measuring is necessary.

The Rotary Head Tool and Die Milling Machine is easier to operate than the plain milling machine since all locations on a given job are obtained by machine. The same skill is required in actually cutting the metal and getting a good finish on the milled surface. Ordinarily less skill is required to turn out an accurate job on this type of machine than on a conventional milling machine.

The Kearney & Trecker machine is especially adaptable for efficiently milling out any shape—male or female—which may be developed by the laws of plane or solid geometry, the dimensions of which are within its range. In the Kearney & Trecker tool room it is being used for milling experimental and master cams, profile milling and jig boring. It has been installed in shops which are using the machines for milling plastic molds, blanking dies, die casting dies, forging dies, templates and general experimental work.

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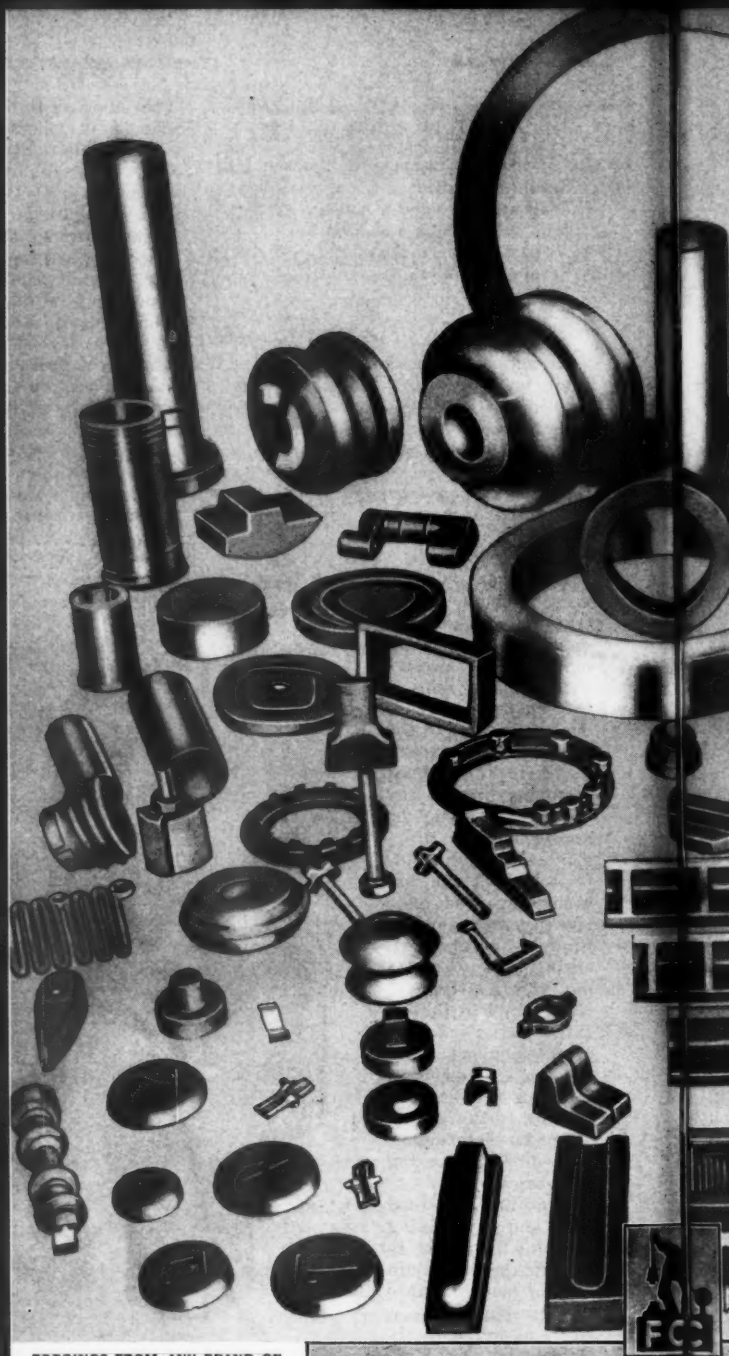

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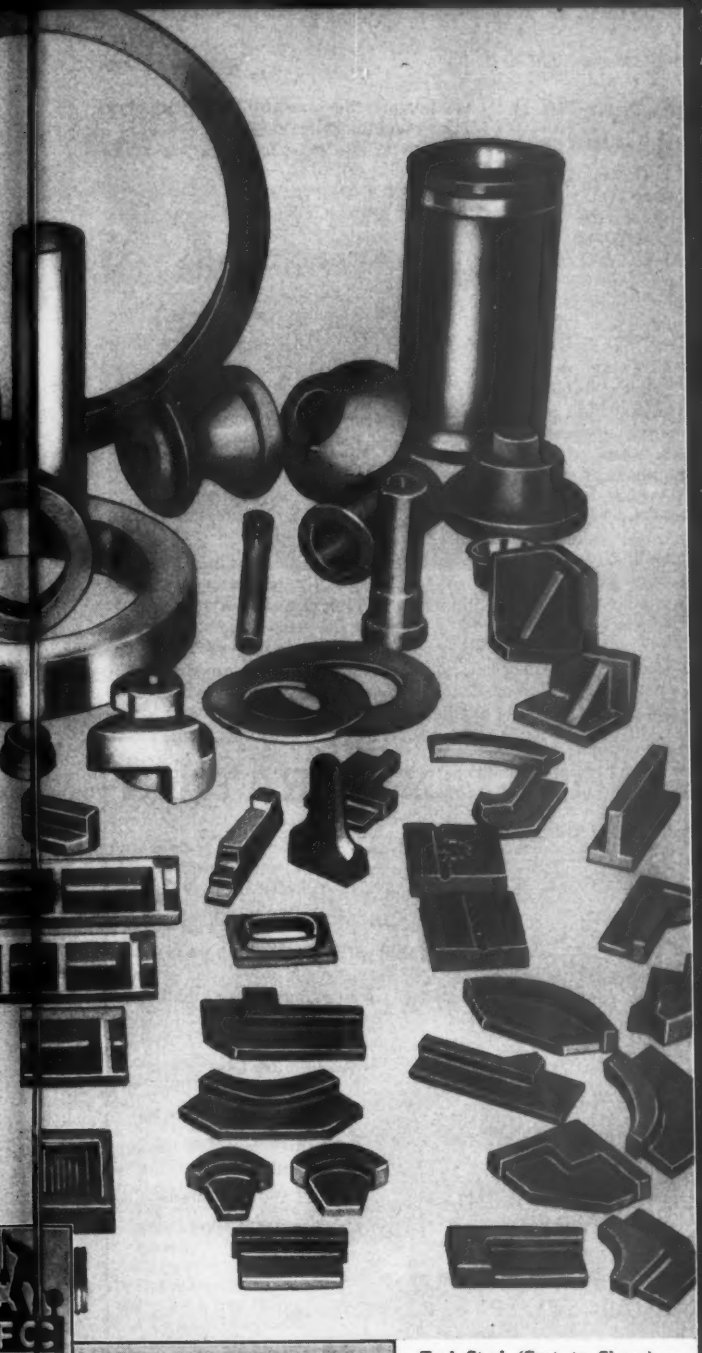

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Norton Announces New No. 2 Cutter and Tool Grinder

AN entirely new No. 2 Cutter & Tool Grinder with several interesting features is announced by Norton Company of Worcester, Massachusetts. One feature is the antifriction table which runs on balls held in a chain-like container. This is important since all the balls of a set are selected for size. Hardened steel ways are used. Another feature is an adjustable braking device which permits a "drag" on the table or for locking it securely in a specified position—important in many operations where a free running table is undesirable.

Being a wheelslide type machine rather than a saddle type, the distance from the front control handwheels to the work center permits comfortable operation from the front. As the work table never overhangs the front of the base, it is firmly supported at all times. Supplementary handwheels at the rear permit operation from either side as well as the front, depending on the nature of the job and the operator's preference. Toe holes at the front and each side of the base permit the operator to stand close to the machine with ease.

The cartridge type ball bearing wheel

spindle is driven by a one horsepower motor carried on the lower end of a heavy column. A single vee belt from the motor through the column drives the spindle. Graduations on the wheel head enable setting the spindle at any angle

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in a horizontal plane.

The machine is available either as a plain cutter grinder or as a universal machine, the only difference being that more equipment is supplied with the universal model. Included as equipment with both models is a universal work head which takes milling cutters having the standard No. 50 (3½" per foot) taper. Supplied with it are reducing collets for No. 12, 10, 9 and 7 B&S and No. 2 Morse tapers. Also supplied is a universal type left-hand footstock which will take No. 9 B&S tapers. Both the universal work head and the left-hand footstock are provided with clearance angle setting dials. In addition to the plain equipment, the universal model includes attachments for internal, surface, cylindrical and gear cutter grinding. Other attachments are available for hob, form, face mill and long reamer grinding.

Norton Company, Worcester, Massachusetts will furnish specifications or other information on the new No. 2 Cutter & Tool Grinder. When you write please mention TDM PROGRESS.

"Mold Steel for Molded Plastics"

THE Carpenter Steel Company has issued a booklet "Mold Steel for Molded Plastics" that die men will find very interesting because in addition to an introduction which discusses the properties of good mold steel, it gives complete descriptions of four mold steels made by this company. These four separate and distinct steels include three low carbon, case hardening mold steels and a high carbon tempering grade of tool steel. The descriptions parallel the introductory properties making each steel convenient to select for the specified requirements on a job. A table of properties of the four steels is included. Equally convenient is the data on a "Matched Set" of three oil-hardening, non-shrinkable tool steels for hobs. Carpenter Steels have been used for years for plastic molds and hobs, their value is proven by the large quantities consumed annually by manufacturers of plastics.

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A NEW basic machine, with a ball bearing work table, that can be used as a precision surface grinder or as a universal cutter grinder, is the latest unit announced by Continental Machines, Inc.

By attaching the motor-spindle head and clamping the magnetic chuck on the top of the work table, the machine is set up as a precision surface grinder. The spindle is a completely enclosed unit, ball bearing mounted, and has a very long support. Extreme accuracy is assured by the special bearing construction which eliminates end play of the spindle. The mounting of the wheel spindle may be set at any angle up to 30°. Permanent high power magnets of special alloy are built into the chuck and a 9" fluorescent (cold light) lamp is mounted so that the back edge of the wheel cover forms a reflector, are also features of this machine.

By attaching the Dumore head and laying the compound table on top of the work table, the machine is set up as a universal tool and cutter grinder. This

(Continued on Page 38)

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Milling Attachment With Unusual Range of Capacity

AFTER more than two years of successful operation in widely diversified industries the Rusnok Vertical Milling Attachment has been further improved and its performance range augmented. The new model becomes an "all-duty" milling attachment designed for perfect service in the lightest high speed operations and including what is said to be the heaviest duty performance as yet successfully accomplished by any machine of its type due primarily to the principle of operation which embodied in the extra heavy spindle.

The Rusnok attachment is equipped with 3" Timken precision roller bearings and a ½ H.P. electric motor with a positive action thermostatic switch. Tool room, die and mold shop operators will recognize the value of the spindle design which uses a No. 9 B&S taper shank for end mill holders or taper shank end mills of the drawbar type. Straight shank end mills in the smaller sizes also are used in this rugged holder thus obviating the use of split collets. Only two such holder sizes are necessary for the range of end mills from $\frac{1}{16}$" to ¾".

The Rusnok "all-duty" high speed attachment used on standard horizontal

(Continued on Page 38)

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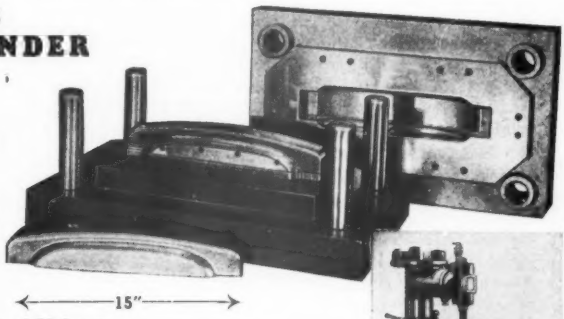

This die, producing a stamping 15" long and 2½" wide, had both concave and convex surfaces that had to be fitted and finished. It was done on a Boyar-Schultz Profile Grinder No. 2, with a saving of 70 hours.

Of course, the die could have been ground, fitted and finished on any of several machines—or it could have been filed and hand stoned. Any shop employing first class mechanics could find a way to do it. But a good share of the time saving was accomplished because other machines require costly "set-up" time that is unnecessary with the Boyar-Schultz Profile Grinder for this kind of complicated die work.

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The Catalog Review

Brief descriptions of current industrial literature including technical booklets and bulletins, catalogs and circulars. All may be had upon request, without charge. . . . Please use identification numbers.

STARRETT DIAL INDICATORS, the second edition of the special catalog of dial gages, illustrates and describes the well-known "Last Word" Indicators made by this company. Information on assembly and service and replacement parts, specifications and a price list are included, making the catalog a practical necessity for shops who use or expect to use these indicators. The Vernier Height Gage (No. 454 in Starrett General Catalog 26-P), an indispensable tool room gage particularly useful for jig and fixture making, is designed to measure or mark off vertical distances from a plane surface. Used with toolmakers' buttons (No. 494, general catalog), the Vernier Height Gage locates the center distances of jigs, dies, etc., to precision limits. Copies of second edition Dial Indicators catalog or General Catalog 26-P which shows the entire line of precision tools, Hack Saws and Steel Tapes may be obtained by writing the L. S. Starrett Company, Athol, Mass.

PARKER VISES CATALOG No. 60, lists this pioneer company's line of machinist vises, swivel jaw and double swivel vises. Parker vises have such features as steel jaws, solid steel strengthening bar, tension springs and screw, solid underportion of slide and oversize screw and nut. Most Parker vises are available in swivel base design. The Catalog also includes line drawings of parts and price list of repair parts. For a copy of Catalog No. 60 write the Charles Parker Co., Meriden, Conn.

BATH GROUND THREAD HANDBOOK (Cat. No. 14) The new, complete dimensional and type listing of the well-known Bath "Ground From The Solid After Hardening" line of taps, thread gages, internal micrometers and thread rolling dies is announced by John Bath & Co., Inc. Much valuable information including tapping do's and don'ts, data on tap design, methods of measuring national form threads, and tables of pitch diameters for taps, basic thread dimensions and tap drill sizes are presented. A good index and full instructions for ordering makes the Handbook easy to use. Address requests for a copy of Bath Ground Thread Handbook on your letterhead to John Bath & Co., Inc., 18 Grafton Street, Worcester, Mass.

SOUTH BEND LATHE CATALOG 100, the new 112-page book describing the Series "T" lathes, lists many improvements in the design of this popular line. Of particular interest to tool rooms and die shops are the Quick Change Gear Lathes, improved saddle and compound rest, double wall apron construction for multiple disc friction clutch and the new pedestal adjustable motor drive. Full specifications, illustrations, improved features, attachments and regular equipment are given for each "T" lathe. In addition to the tool room precision lathes, the new models of the 9-inch "Workshop" lathes and the 16-24-inch General Purpose Lathe are included. There is a section on Attachments, Chucks and Tools. For a copy of Catalog 100 write South Bend Lathe Works, 423 E. Madison Street, South Bend, Ind.

STANDARD AND SPECIAL WASHERS, new stock list No. 55-C, is announced by the Wrought Washer Mfg. Co., of Milwaukee, Wisc., world's largest producer of washers, expansion plugs, stampings, tools and dies. This new publication lists thousands of washer specifications in various materials including steel, brass, copper, aluminum, fibre, etc., carried in actual inventory available for immediate shipment. All items permanently maintained in stock are so designated. Copies of stock list No. 55-C are available to shops on request.

Die Designing and Estimating

(Continued from Page 18)

units respectively because their radii are less than ¼" but the minimum contour unit in Group D operations being 4, that figure should be used.

PERFORATORS — 5 @ 2 units each 1.0

PILOTS—2 @ 2 units each 4

Inspection
See Table, Fig. 10

DIE OPENINGS — 6 as above with same tolerance specified (.5 hr. each plus die opening time) 6.7

TOTAL Column C .....11.8 hrs.

MACHINING, FINISHING AND FITTING DIE PARTS

Column D—contour units for openings as established for Column C are used, also drawings and Tables, Figs. 13-20.

	Machining	Finishing
DIE OPENING A—units 14, size 8"		
Machining per Table 14.	11.0 hrs.	
Finishing per Table 15..		1.1 hrs.
DIE OPENING B—units 4, size 2"	4.0	.4
DIE OPENING C—units 4, size 4"	4.0	.4
DIE OPENING D—units 4, size 1"	4.0	.4
DIE OPENING E—units 4, size 2"	4.0	.4
DIE OPENING F—units 7, size 4"	6.0	.6
Sub-total	36.3 hrs.	

PUNCHES — See Table, Fig. 16 and drawings Fig. 17.

No. 5—Type 1—units 14, size 8".7.7 hrs.
No. 7—Type 1—units 4, size 2"..2.8
No. 8—Type 2—units 4, size 4"..4.8
No. 10—Type 1—units 4, size 1".2.0
No. 6—Type 1—units 4, size 2"..2.8
No. 11—Type 2—units 4, size 4".4.8

FORM PAD, No. 9 is really a type 2 shedder — units 4, size 4" 4.0

INSERT No. 13 is equivalent to a type 1 punch—units 4, size 1" 2.0

(Continued on next Page)

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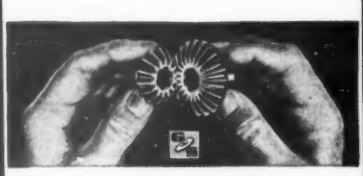

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Die Designing and Estimating

(Continued from Page 27)

INSERT No. 12—type 2 punch—units 7, size 4" 6.0

PUNCH PLATE OPENINGS FOR PUNCHES

No. 7—units 4, size 2" 1.2
No. 10—units 4, size 1" 8
No. 6—units 4, size 2" 1.2

STRIPPER—Clearance holes

FOR PUNCH No. 5—units 14, size 8" 2.2
FOR PUNCH No. 7 — units 4, size 2" 8
FOR PUNCH No. 8 — units 4, size 4" 8
FOR PUNCH No. 10 — units 4, size 1" 8
FOR PUNCH No. 6 — units 4, size 2" 8
FOR PUNCH No. 11 — units 4, size 2" 8

GAGES—See Table, Fig. 19 and drawings, Figs 20 and 20A. Dies which have been estimated to date in this series have not required the use of this table of time values. The area of the material to be removed and its depth determine these values. Procedure for this die is as follows: Two grooves or slots for guiding the stock are to be cut. The gages are about 6" long, the undercut about ⅛" and depth of cut about ⅛".

6"x⅛" = ¾ sq. in. of area. Using the closest table dimension 1 sq. in. x ⅛" depth of cut, the time value is .6 hour and for 2 cuts 1.2

Punches for which clearance must be provided are: No. 5—approximately 2½" x ¼" = 1¼ sq. in. depth of slot ¼"—time value 6

No. 7—¾" x ½" = ⅜ sq. in. x ¼" depth 6

No. 8 — the same approximate dimensions 6

Clearance holes for slugs must be provided in the die shoe as follows: (Fig. 16)

PUNCH No. 5—units 14, size 8"..3.3
PUNCH No. 7—units 4, size 2"..1.2

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Die Designing and Estimating

(Continued from Page 28)

PUNCH No. 10—round hole 2
PUNCH No. 6—units 4, size 2"..1.2
PUNCH No. 11—units 4, size 2".1.2

TOTAL Column D .....92.7 hrs.

PERFORATORS, PILOTS AND THEIR CORRESPONDING HOLES

Column E — see drawings and Tables, Figs. 21-24.

PERFORATORS — Piece part drawing Fig. 36 shows perforators as follows with time values according to Table, Fig. 22.

1—.093" diameter ..... .7 hr.
2—.125" " @ .5 hr. each.1.0
2—.187" " @ .5 hr. each.1.0

Table, Fig. 23 establishes the time value for finishing the 5 perforator holes @ .9 hr. each.4.5

PILOTS—2—.187" diameter @ .5 hr each, Table 22 .....1.0

2 corresponding holes @ .9 hr. each, Table 24 .....1.8

STRIPPER BOLTS—Type II pin in Fig. 27 illustrates the standard stripper bolt. Time for making 8 @ .2 hr. each 1.6

TOTAL Column E .....11.6 hrs.

ASSEMBLY, TRYOUT, DEVELOPMENT

Column F — see Table, Fig. 28 and descriptive material which accompanies it.

ASSEMBLY—Mounting die and stripper .....3.0 hrs.
Mounting 6 punches @ 1 hr. each 6.0
Mounting form pad No. 9 .....1.0
Mounting 2 inserts @ 1 hr. each.2.0
Mounting assembled punch plate on punch holder 3.0
Mounting 5 perforators @ .5 hr. each 2.5
Mounting 2 pilots @ .5 hr. each.1.0
TRYOUT 6.0

DEVELOPMENT — 1 single L bend for the lug 3.0
4 consecutive bends for channel form @ 2 hrs. each 8.0

TOTAL Column F .....35.5 hrs.
Estimated hours of labor required .....172.1 hrs.

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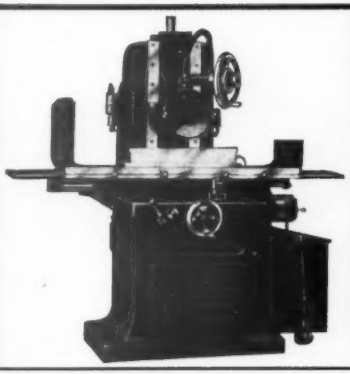

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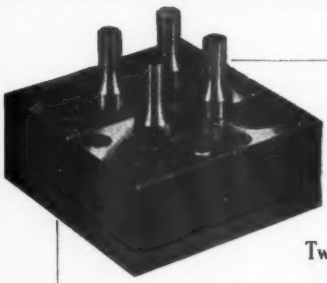

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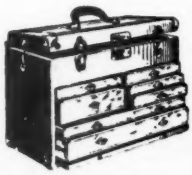

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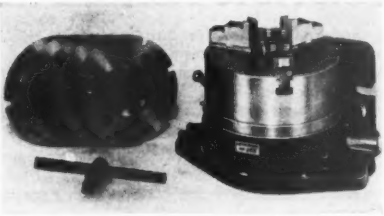

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Motor Drives, Gears, Worms, Tools, Fixtures
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Specialists in the Designing and Building of Progressive Dies
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Designers and Manufacturers
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Modern equipped shop for building of
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Equipment includes:
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When you order or write about products described in TDM PROGRESS please mention the publication.

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1436 East 47th Street Founded in 1903
Builders of Special Machinery
GENERAL MACHINE WORK

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Designers and Builders
SHEET METAL DIES, TOOLS, SPECIAL MACHINERY, DIE CASTING DIES
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Modern Facilities
150-Man Shop

*See larger display advertisement also.

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JIGS, FIXTURES, DIES
Experimental Work

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PLANERS
42" by 14 ft. long
24" by 6 ft. long
Let us figure

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EXTERNAL CYLINDRICAL LAPPING MACHINES
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DESIGNERS AND BUILDERS
Special Machinery
TOOLS, JIGS and FIXTURES

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Dies, Jigs, Fixtures, Gages, Special Machinery
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"Let us be your tool room."
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THE J. C. ULMER COMPANY
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Designers and Builders of
Tools, Dies, Jigs, Fixtures, Special Machinery
The Hamilton Portable Elevating Table

When you order or write about products described in TDM PROGRESS please mention the publication.

WITTEK
automatic
Roll Feeds
for every size and type of punch press

WITTEK Feeds handle any coiled stock and feed either from right to left, left to right, front to back, or back to front in any length from 0" to 24" per press stroke. Made in Single Roll without straightener, and Compound Types. WITTEK feeds are preferred because they combine high speed, accuracy with low maintenance cost. They save dies, reduce scrap to a minimum and make high speed automatic production practical even on comparatively short runs.

Wittek Reel Stands —6 models—a reel stand for every job —will handle any size coiled stock.

Write for Bulletin TD

WITTEK MANUFACTURING CO.
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STAMPS & DIES
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MARKING PROBLEMS INVITED
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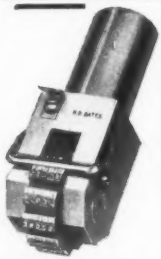


H. O. BATES, MARKING DEVICES
251-257 North Broad Street
ELIZABETH, N. J.

New DoAll Grinder Is Convertible

(Continued from Page 24)

head affords every possible positioning with quick setup and absence of vibration. Infinite planes of full circle movement of its wheel head allow a capacity never before possible in a cutter grinder. Sharpening operations for the angles, sizes and shapes of modern tools are provided for by the new limits of capacity and the flexibility in this machine. The dividing head of the machine has two graduated axes and can also pass laterally across the compound table at any angle with the use of the hand lever.

A third function—intricate cylindrical grinding is made possible by providing a head stock which drives the work between centers.

A new illustrated folder on the DoAll Grinder will be sent on requests made to Continental Machines,, Inc., 1303 So. Washington Ave., Minneapolis Minn.

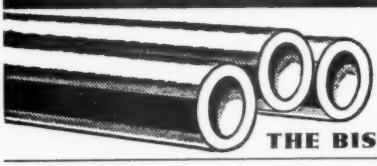
Unusual Range Milling Attachment

(Continued from Page 25)

milling machines has in the comparatively brief period since it was introduced performed satisfactorily in the making of blanking and forming dies, die casting dies, plastic and rubber molds, wood and metal patterns, numerous kinds of special tools, jigs and fixtures and recessing tool shanks for carbide tips. Easily within the demonstrated capacity of the attachment are the surfacing of mild steels and cast iron, key slotting, the boring of large holes, fly cutting without chatter and numerous other operations for which end mills, slitting saws and other small angle milling cutters are required.

Specifications are contained in a new illustrated Folder D. Address Lockwin & Company, 205 West Wacker Drive, Chicago, Illinois.

OIL HARDENING TOOL STEEL TUBING



Substantially reduces labor costs by eliminating the expensive procedure of drilling from the solid.

BISCO TOOL STEEL TUBING is a fine grade tool steel in tubular form available in sizes up to 14" diameter and 2" wall thickness; other sizes to your specification.

Tool Steels Alloy Steels Stainless Sheets and Bars

THE BISSETT STEEL COMPANY 947 E. 67th St., Cleveland, Ohio

When you order or write about products described in TDM PROGRESS please mention the publication.

CUT MILLING COSTS

This machine was designed for a prominent tractor manufacturer to straddle mill one boss, base mill another and tap two individual holes in different planes. Its use will mean an important reduction in the production cost of finishing axles. We design and build a wide variety of special machines.

Our organization offers production manufacturers many years of invaluable experience.

We also design and build jigs, fixtures and gages.

Our prices are right, our workmanship is guaranteed.

THE SOMMER & ADAMS COMPANY

18511 EUCLID AVENUE • CLEVELAND, OHIO

Builders of Automatic Machines for Milling, Drilling, Polishing

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MARVEL SAWS

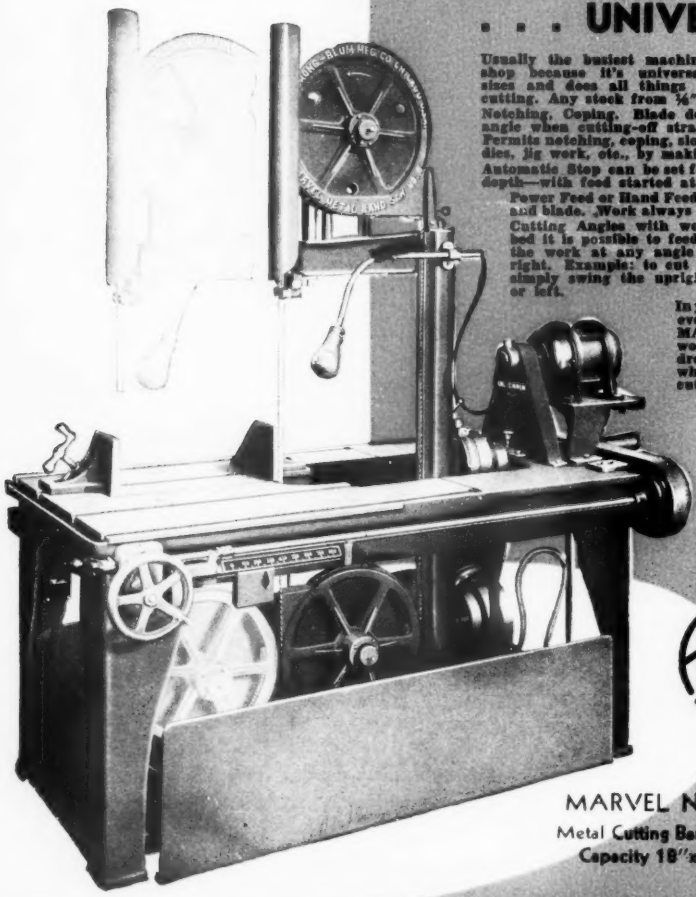
The Saw "With 100 Uses" . . . UNIVERSAL

Usually the busiest machine tool in any shop because it's universal—handles all sizes and does all things well. Straight cutting. Any stock from ⅛"x⅛" to 18"x18". Notching, Coping. Blade does not change angle when cutting-off straight or square. Permits notching, coping, slotting, shanking dies, jig work, etc., by making only 2 cuts. Automatic Stop can be set for any required depth—with feed started at any point.

Power Feed or Hand Feed moves carriage and blade. Work always held stationary.

Cutting Angles with work flat on the bed it is possible to feed the blade into the work at any angle to 45° left or right. Example: to cut a perfect mitre simply swing the upright to 45° right or left.

In your shop, whatever your work, the MARVEL No. 8 would find "a hundred uses" on which it would cut costs.



MARVEL No. 8
Metal Cutting Band Saw
Capacity 18"x18"

ARMSTRONG-BLUM MFG. CO. *"The Hack Saw People"* CHICAGO
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